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IMPACT OF FUSIFORM RUST ON SLASH PINE PLANTATIONS IN CENTRAL LOUISIANA - A PROGRESS REPORT -

by

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ABSTRACT

A fourth year's data on 1, 5, and 10-year old slash pine stands revealed 13 to 16 percent rust mortality. Mean annual increase in rust mortality ranged from 1.6 to 4.3 percent for all age classes. Mortality from all causes reached 36 percent with the 1-year-old plantations. Stem-cankering increase in 1976-77 ranged from 2.5 to 6.0 percent, but occurred only in the 5, 10, and 15-year-old stands. Cankers growing into the stem in 1976 to 1977 were most prevalent in 2- and 3-year-old plantations where this occurred with 15 and 10 percent of the branch cankers. Volume differences were detected only in the 15-year-old plantations and only between trees killed by rust and healthy, stem-cankered or branch-cankered trees.*

INTRODUCTION

In 1974 row plots were established in 1, 2, 3, 5, 10, and 15-year-old slash pine plantations in Beauregard, Allen, Calcasieu, Vernon, and Rapides Parishes. Four plantings per age class were chosen. In the winter of 1974-75 one and one-half 15-year-old* plantations were thinned.

Rust data taken through 1976 revealed at least a 45 percent stem canker incidence in all age classes except the 1- and 3-year-olds. Stem canker incidence for individual plantations in all age classes ranged from 22 to 64 percent. Rust mortality ranged from 10 to 14 percent with the 1, 5, and 10-year age classes. All other age classes had less than 10 percent.

* Ages of plantations in this report are given as of the winter of 1973-74.

Theoretical thinnings of rust infected trees in 1976 removed 12 to 32 percent of the volume in seven 10 and 15-year-old plantations. However, this loss would serve to increase the diameter of residuals, thus partially offsetting the loss. Basal area per acre was reduced to 67, 71, and 92 square feet on three 15-year-old stands. Since only severely cankered trees were removed, the basal areas of the remaining stands would be even less if the unthrifty, uncankered trees were also removed in actual thinning. Basal area removed was consistent. It ranged from 27 to 29 square feet.

MATERIALS AND METHODS

In the winter of 1976-77 diameter and height measurements were taken on 10- and 15-year-old plantations, and the area of the six sample rows in each plantation was obtained. Areas of older plantations were obtained by pacing the various rows and multiplying by the distance between rows. Five heights per diameter class were taken. These were measured with a clinometer or Abney level and pacing.

RESULTS

In 1977 at least a 1.7 percent increase in rust mortality occurred in every age class over that of 1976. The range of increase was 1.7 to 4.7 percent. Highest increases occurred in the 1, 5, and 15-year-age classes. Stem cankering increased - the range of increase was 2.5 to 6.0 percent. Incidence ranged as high as 68 percent.

Branch cankers growing into the stem were most prevalent in the 2- and 3-year-old stands. Approximately 15 percent of the branch cankers on 2-year-old trees in 1976 became stem cankers in 1977. Over the same interval, 10 percent of the branch cankers became stem cankers in the 3-year-olds.

The mean annual increase in rust mortality has been sizeable for all age classes over the interval 1974 to 1977. This amounted to 4.3 percent in the 1-year age class. Five-year-old trees have had a 3.0 percent increase. Other age classes, although less than 3 percent, showed at least a 1.6 percent mean annual increase in rust mortality.

Volume differences between various condition classes were not present in the 10-year age class. Fifteen-year stands indicated a difference in 1975 and 1977 between the dead rust condition class (means - .036, .035 cords) and the healthy, stem canker and branch canker classes (means - healthy - .054, .061 cords; stem canker - .052, .056 cords and branch canker - .056, .065 cords). These differences were not analyzed statistically for significance.

Two 10-year-old plantations attained the 80 percent infection level and above. These plantations revealed rust mortality percentages of 22 and 26. These stands have undergone prescribed burning prior to the 1975 and 1977 readings. Burning may have killed some stem-cankered trees.

Two five-year-old plantations revealed 67 percent stem-cankering. One plantation had over 80 percent infection. While mortality is only 6 and 14 percent, this condition class may rise rapidly in the future.

Mortality from all causes is quite high in the 1-year age class. Industry feels that plowing of plantations reduces fire hazard. However, the combination of mortality from plowing fire lines and rust has reached 36 percent on this age class.

The data by age class is presented in the appendix for the four years. Four 1976 plantings were also read for rust. In these new plantations percent infection amounted to 5 and stem-cankering to 3.6.

DISCUSSION

Most of the age classes in rust incidence and all in rust mortality are rising in percentage. For these reasons, it has been decided to continue the study for a fifth year. Condition class will be taken on all age classes but the 15-year-olds. No new plantations will be read. The 10 and 15-year-old stands will be thinned. Three years after thinning, the trees will be read again for condition class.

One-year-old plantations were last read at four years of age. These must be maintained for another 11 years before thinning. Industry might not be able to afford these losses and thus may have to regenerate such stands.

Five-year-old plantings are likewise severely infected. Approximately 13 percent of the trees are dead from rust. Almost 38 percent are living with stem cankers. At the last reading these plantations still have seven years before thinning. The mean annual increase in rust mortality is 3.0 percent for this age class. At that rate, these trees in seven more years will have lost 34 percent to rust. These stands may not be adequately stocked then.

Nearly 16 percent rust mortality has occurred with the 10-year class. However, these stands will probably be thinned in two years. Thus, rust has far less time to damage these stands than the plantings of one and five years.

APPENDIX

1 - Healthy
2 - Stem
3 - Branch
4 - Dead (Rust)
5 - Cabbage
6 - Dead (Other)
7 - Branch Stem

1-year age class

	Condition Class (%)						
Year	1	2	3	4	5	6	7
'74	64.8	30.2	2.0	1.5	0.1	1.3	-
'75	52.1	28.8	1.5	5.6	0.1	10.3	0.6
'76	42.5	27.9	5.0	9.7	0.2	13.7	1.0
'77	28.6	21.6	11.2	14.4	1.3	21.7	1.2

2-year age class

	Condition Class (%)						
Year	1	2	3	4	5	6	7
'74	52.0	29.4	17.2	0.1	0.5	0.8	-
'75	39.1	36.9	17.5	1.2	0.7	3.4	1.1
'76	32.2	39.9	15.5	3.0	1.2	4.2	4.0
'77	29.8	36.6	13.1	4.9	4.6	4.8	6.2

3-year class

	Condition Class (%)						
Year	1	2	3	4	5	6	7
'74	47.5	12.3	38.5	0.5	0.6	0.5	-
'75	35.6	19.8	40.4	1.0	0.7	1.8	0.8
'76	37.7	20.4	24.7	3.9	0.9	5.8	6.6
'77	33.1	21.0	23.8	5.8	1.0	6.2	9.2

5-year class

	Condition Class (%)						
Year	1	2	3	4	5	6	7
'74	49.3	31.7	12.3	3.6	2.9	0.3	-
'75*	30.3	29.2	26.4	8.5	2.4	4.1	0.9
'76	26.6	39.3	19.4	10.5	1.5	2.7	3.2
'77	24.7	37.7	14.8	12.7	1.0	2.8	6.4

10-year class

	Condition Class (%)						
Year	1	2	3	4	5	6	7
'74	51.3	32.0	6.9	8.2	1.2	0.4	-
'75	35.4	32.0	19.0	12.3	0.7	0.6	0.5
'76	25.8	38.1	20.7	14.1	0.7	0.6	1.7
'77	24.9	37.9	17.2	15.9	0.5	0.7	2.9

15-year class

	Condition Class (%)						
Year	1	2	3	4	5	6	7
'74	47.4	39.7	5.7	6.9	0.1	0.3	-
'75	42.3	42.5	13.3	7.9	0.1	0.5	1.1
'76	29.8	42.6	16.0	10.6	0.1	0.9	0.6
'77	25.0	42.2	15.9	13.3	0.1	1.3	2.3

1976 plantings

Condition Class (%)					
1	2	3	4	5	6
89.2	3.6	1.5	0	0	5.8

* Based on three plantations only.